

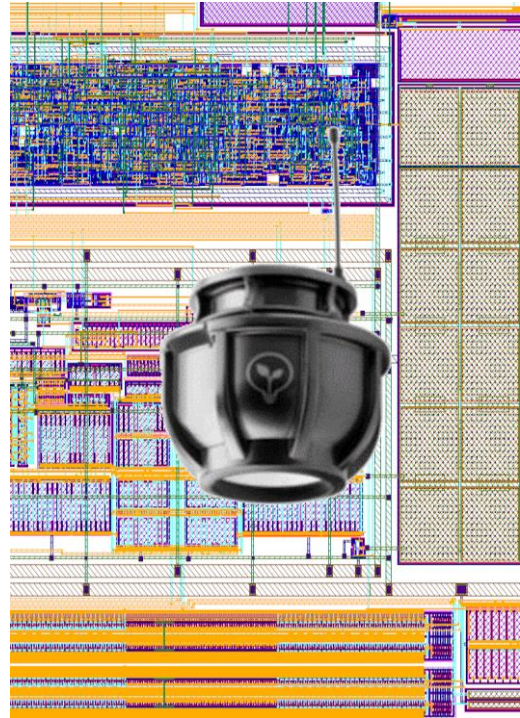
Master Thesis (with possibility of PhD Thesis)

at the integrated circuits and systems group (ICAS) and chemical transducers group (GTQ)

Energy Harvesting Integrated Circuit for Microbial Fuel Cells

Description

This work aims to develop novel very low-power circuit architectures for managing microbial soil fuel cells (MSFCs). MSFCs are now considered as one of the greenest and eco-friendliest energy sources, since they extract energy directly from soil components (i.e. bacteria acting as biocatalyst and organic matter as fuel) without any consumption of natural resources. Despite their sustained delivery of energy without interruptions in time, typical MSFCs instantaneous power rates are extremely low, so in practice a large part of the supply current from the cell is already consumed by the power management system. For this reason, it is the objective of the present work to develop an innovative application-specific circuit (ASIC) for the energy harvesting and power management with minimal energy losses.



Background and skills

- Electronic engineering or any similar curriculum covering: CMOS technology basics, MOS device modeling, analog and digital CMOS circuit design and power conversion architectures.
- Knowledge of EDA tools and HDLs for full-custom mixed-signal IC design.
- Capability of working as a team.
- Good spoken and written English.

Tasks

The student will design the ASIC CMOS blocks for energy harvesting and power management following the standard full-custom mixed-signal IC design methodology including both schematic and layout. The target integration scaling will range from 180-nm to 65-nm CMOS technology nodes. All the above tasks will be performed in the IMB-CNM lab facilities at the UAB Bellaterra Campus.

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